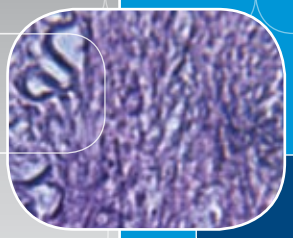
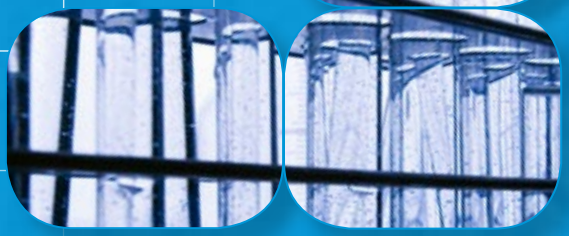


Airstream®

*Airstream Class II Type B2 (Total Exhaust) Biological Safety Cabinet, Model AB2-4S_. Shown with optional support stand.*

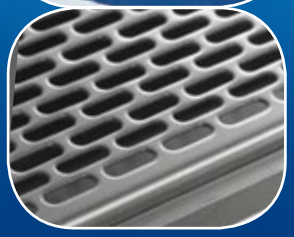
# Class II, Type B2 (Total Exhaust) Biological Safety Cabinets

***The Safety Solution for Life Science Laboratories***



ESCO

WORLD CLASS. WORLDWIDE.



## Main Features

- The best value of any Type B2 (Total Exhaust) Biological Safety Cabinet in the industry.
- Less energy consumption and heat output than competing products delivers lower total cost of ownership.
- The angled front, narrow profile front grille, raised armrest and frameless sash create an ergonomic work environment.
- Single piece stainless steel internal work zone eliminates welded joints where contaminants may accumulate.
- Dual-wall construction surrounds the work zone with negative pressure plenums for maximum safety.
- Fail-safe system ensures that in case of exhaust failure, the cabinet's main fan automatically shuts down to ensure safety to the user.
- Unique Esco Dynamic Chamber™ plenum design delivers quiet, uniform airflow.
- Long life ULPA (per IEST-RP-CC001.3) supply filter and HEPA exhaust filter for airflow.
- Esco Sentinel™ microprocessor supervises all cabinet functions.
- Esco ISOCIDE™ antimicrobial coating on all painted surfaces minimizes contamination.

*Airstream Class II, Type B2 (Total Exhaust) Biological Safety Cabinet (AB2), Model AB2-4S_. Shown with optional support stand.*

***Operator, Product and Environmental Protection***

*The Esco Airstream Class II, Type B2 (Total Exhaust) Biological Safety Cabinet provides operator, product and environmental protection against Biosafety Levels 1, 2 and 3. This cabinet can be used for handling Biohazard Level 4, provided that the operator wears positive pressure suit.*

## Containment and Protection

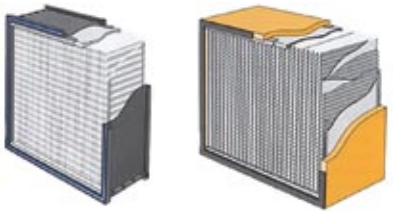
- Exhausting to the outside environment via dedicated ducting enhances laboratory personnel protection.
- Inflow of room air enters the front air grille to establish operator protection; room air does not enter the work zone, preventing product contamination.
- Fail-safe exhaust interlock system switches off main fan in the event of an exhaust fan failure or blockage.
- Raised armrest prevents the likelihood of inflow grille blocking by operator's arms.
- Auto-purge holes located at the front side walls eliminate eddy currents and dead air pockets in the critical area behind the sash window.
- The inflow velocity, downflow velocity, air flow path, and intake geometry are precision tuned and tested to create an optimum air curtain on the front aperture; this curtain maintains operator and product protection even in the unlikely event of a severe inflow or downflow imbalance that would compromise protection in a conventional cabinet.

## Integrated Filtration System

A combination of a supply ULPA filter and an exhaust HEPA filter gives the AB2 cabinet a fully integrated performance envelope for product, operator and environmental protection.

- ULPA filters (per IEST-RP-CC001.3), are tested to a typical efficiency of >99.999% for 0.1 to 0.3 micron particles.
- HEPA filters are tested to a typical efficiency of >99.99% for 0.3 micron particles.
- Modern separator-less mini-pleat filter construction maximizes the filter surface area to extend filter life and eliminate possible filter media damage by thin and sharp aluminum separators used in conventional HEPA filter construction.

***Mini-pleat Separatorless Filter (left) vs. Conventional Aluminium Separator Filter (right)***



*Esco cabinets use Swedish Camfil Farr® mini-pleat filters without aluminum separators to increase filter efficiency, minimize the chance of leakage, and to prolong filter life. Filters include a lightweight aluminum frame for structural stability and elimination of swelling common to conventional wood frames.*

- The filter frame and media is constructed in accordance with EN 1822 requirements for fire retardant properties.
- The supply ULPA filter provides ISO Class 3 (per ISO14644.1) clean air to the work surface in a gentle vertical laminar flow for product protection.
- The exhaust HEPA filter traps biohazardous particles acquired from the work surface before air is exhausted via dedicated ducting to the outside environment, offering operator and environmental protection.
- The exhaust filter media is protected from mechanical damage by an integrated metal screen guard, which is absent from conventional HEPA filters.

## Blower Efficiency

The Airstream blower system is designed for high performance operation, maximum energy efficiency and minimal maintenance.

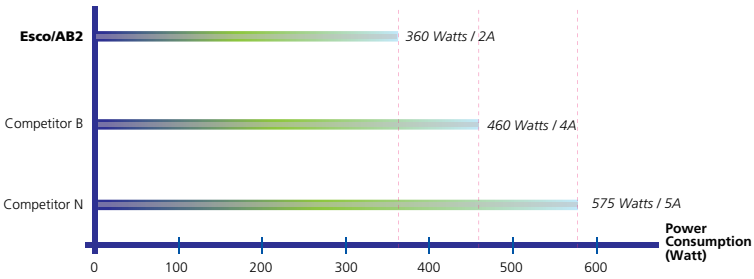
- The permanently lubricated direct-drive external rotor motor / blower reduces operating costs.
- The external rotor motor design allows for optimum cooling of the motor during extended operations and extends the motor bearing life.
- An integral blower hour meter tracks operating life and aids in predictive maintenance planning.

## Sentinel™ Microprocessor Control, Alarm, Monitoring System

The Esco Sentinel™ microprocessor-based control system supervises operation of all cabinet functions.

- The control panel is located on the center of the cabinet, and angled down for easy access by the operator
- Continuous monitoring of cabinet airflow is displayed on a bright, easy-to-read LCD panel. The large display monitors operational parameters.
- An integrated, temperature-compensated true airflow velocity sensor provides an accurate airflow reading despite room temperature fluctuation.
- All electronic parts are contained inside a plug-and-play module that permits easy exchange if required.






## Energy Efficiency Chart

*The Esco AB2 cabinet utilizes an extremely efficient backward curve fan, allowing for exceedingly low levels of cabinet power consumption that are unparalleled in the industry.*

*The result is greater cost-savings for the user with no compromise in cabinet performance.*

| Standards Compliance | Biological Safety Cabinets | For Air Quality | For Filtration | For Electrical Safety |
|---|---|---|---|---|
| | NSF/ ANSI 49, USA<br>EN 12469 , Europe<br>SFDA YY-0569, China | ISO 14644.1 Class 3, Worldwide<br>JIS B9920, Class 3, Japan<br>JIS BS5295, Class 3, Japan<br>US Fed Std 209E, Class 1 USA | IEST-RP-CC034.1, Worldwide<br>IEST-RP-CC007.1, Worldwide<br>IEST-RP-CC001.3, Worldwide<br>EN 1822, Europe | IEC 61010-1, Worldwide<br>EN 61010-1, Europe<br>UL 61010-1, USA<br>CAN/CSA-22.2, No. 61010-1 |

- Microprocessor software updates are available from Esco for download via the Internet.

Sentinel™ functions are factory set to default to ON or OFF, depending on worldwide destination and local preferences. Default settings can be user activated through the touchpad data entry access.

- Automatic start-up sequence will prepare the cabinet for normal operation and advise when safe conditions are established.
- An administrator controlled PIN (personal identification number) can be set to restrict access to main menu.
- The airflow alarm can be activated or deactivated depending on user preference and nature of the work.

Consult your Esco Operating Manual or contact your Sales Representative for information on user-preference programming capabilities built into the Sentinel™ microprocessor platform.



## Cabinet Construction

Robust construction and enhanced safety features qualify the cabinet for the most demanding laboratory applications. The cabinet is fully assembled and ready to install and operate when shipped.

- The interior work area is formed from a single piece of stainless-steel with large radius corners to simplify cleaning.
- The cabinet work zone has no welded joints to collect contaminants or rust.
- All stainless steel work surfaces are accessible for cleaning.
- Tray components lift and remove to provide easy access and encourage surface decontamination.
- A recessed central area and drain pan contain spills and prevent liquids from entering the lower filtration and blower systems.
- There are no screws on the front or sides to trap contaminants or complicate cleaning.
- Optional service fittings are offset for easier access.
- External surfaces are coated with Esco Isocide™ antimicrobial coating to protect against surface contamination and inhibit bacterial growth. Isocide™ eliminates 99.9% of surface bacteria within 24 hours of exposure.

## Service Fitting Access

The cabinet is prepared for easy installation of optional gas and vacuum fittings; see Accessories.

- Optional service fittings openings are offset for easier access.

## Comfortable Ergonomic Design

The AB2 cabinet is engineered for comfort, utility value and safety.

- The angled viewing window improves reach into the work area.
- The instant-start 5000k fluorescent lamp operates on an electronic ballast to reduce heat, improve comfort and conserve energy.
- The lamp delivers uniform lighting to the work surface for greater comfort, reduced glare and improved productivity (see Technical Specifications).
- The front armrest is raised above the work zone to improve comfort and to ensure that the operator's arms do not block the forward airflow perforations.
- The frameless sash eliminates operator's line of sight blockage
- The sliding window can be fully opened to insert and remove larger instrumentation and equipment.

## Electrical Safety and Certification

All components meet or exceed applicable safety requirements.

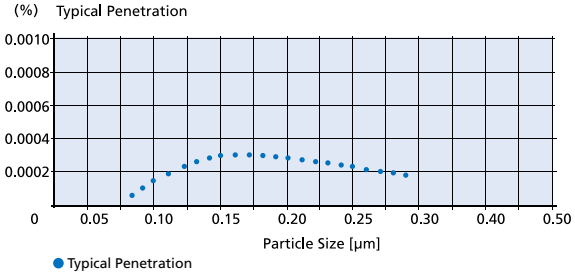
- Each cabinet is individually factory tested for electrical safety.
- Documentation specific to each cabinet serial number is maintained on file.
- Designed to meet major world standards for microbiological safety cabinets, such as NSF 49, SFDA YY-0569, and EN 12469 (refer to Technical Specifications for the full list).
- Contact Esco or your Sales Representative for site preparation information; see Electrical Specifications.

## Warranty

The AB2 cabinet is warranted for 3 years excluding consumable parts and accessories.

- Each cabinet is shipped with a comprehensive User's Manual complete with a report documenting all test procedures.
- Additional IQ/OQ documentation is available upon request.
- Contact your local Sales Representative for specific warranty details or documentation requests.

## Esco ULPA Filter Efficiency




*Esco cabinets use supply ULPA filters (per IEST-RP-CC001.3) instead of conventional HEPA filters commonly found in biological safety cabinets. While HEPA filters offer 99.99% typical efficiency at 0.3 micron level, ULPA filters provide 99.999% typical efficiency for particle sizes of 0.1 to 0.3 micron level.*

*Touchpad data entry buttons permit control settings and access to diagnostics, default settings and hierarchical menus.*

*Color coded indicator lamps display green for primary function (fan operation); blue for secondary function (fluorescent lights and electrical outlet); and orange for caution (UV lamp ON).*

*Programmable automatic UV light timer simplifies operation, enhances contamination control, extends UV lamp life and saves energy.*

*A graphical interface indicates cabinet performance.*

*Digital read-out with alpha-numeric display indicates all input, status and alarm functions.*

*All functions can be user activated through touch-pad programming access; see Operations Manual.*

*Sentinel Microprocessor Control System, Programmable*

■ *When programmed ON*

- *the start-up sequence confirms status with Air Safe and local time display.*
- *the Personal Identification Number (PIN) access restricts unauthorized adjustments.*
- *an airflow alarm warns of deviations from normal velocities.*

## Accessories and Options

Esco offers a variety of options and accessories to meet local applications. Contact Esco or your local Sales Representative for ordering information.

### *Support Stands*

- Fixed height, available 711 mm (28") standard size or 864 mm (34"),
  - With leveling feet (±38.1 mm /1.5")
  - With casters
- Telescoping height stand for leveling feet, nominal range 660 mm to 960 mm (26" to 37.8")
- Telescoping height stand for casters, nominal range 660 mm to 880 mm (26" to 34.6")
  - Adjustable in 25.4 mm (1") increments

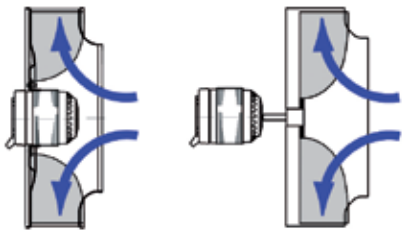
### *Electrical Outlets and Utility Fixtures*

- Electrical outlet, ground fault, North America
- Electrical outlet, Europe / Worldwide
- Petcock (air, gas, vacuum)
  - North America (American) style
  - Europe / Worldwide style DIN 12898, DIN 12919, DIN 3537

### *Cabinet Accessories*

- Germicidal UV lamp
  - Controlled by automatic UV lamp timer through Sentinel™ microprocessor control panel
  - Emission of 253.7 nanometers for most efficient decontamination
  - Lamp is positioned away from operator line of sight for safety and proper exposure to interior surfaces.
- PVC armrest
  - Chemically treated, improves operator comfort, easy to clean.
- Ergonomic lab chair
  - Laboratory grade construction, meets Class 100 cleanliness; alcohol resistant PVC materials
  - Adjustable height 395-490 mm (15.6"-19.3")
- Ergonomic foot rest
  - Angled, helps maintain proper posture
  - Adjustable height
  - Anti-skid coating, chemical resistant finish
- IV bar, with hooks
  - Stainless steel construction
  - Available for all standard Esco cabinets
- Microscope viewing device
  - Mounting and viewing pouch integrated into sash. Factory installed; specify when ordering.
- Anti blowback valve
  - Prevents flow from the facility HVAC system into the Esco product.
- Air tight damper
  - Seals the Esco product from the facility HVAC system during decontamination.

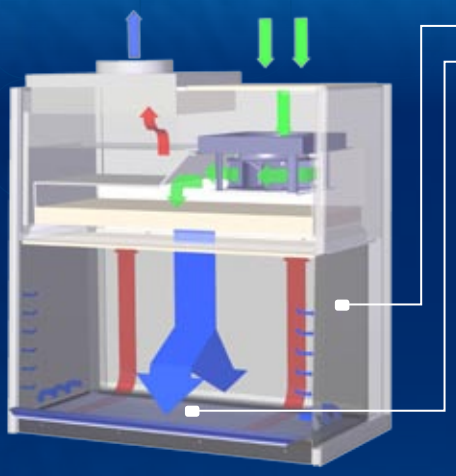




## Esco Centrifugal Fan with External Rotor Motor (left) vs. Conventional Fan with Standard Motor (right)

- *Esco Airstream cabinets use a combination of high performance scroll blowers (supply) and German made **ebm-papst**® permanently lubricated, centrifugal motor/blowers with external rotor designs (exhaust).*
- *Selected for energy efficiency, compact design, and flat profile, the completely integrated exhaust blower assembly optimizes motor cooling, with unified rotating parts and overall component balance for smooth, quiet, vibration-free operation.*
- *Weight is equally distributed to all bearings to extend bearing life, transfer heat and maximize speed control.*

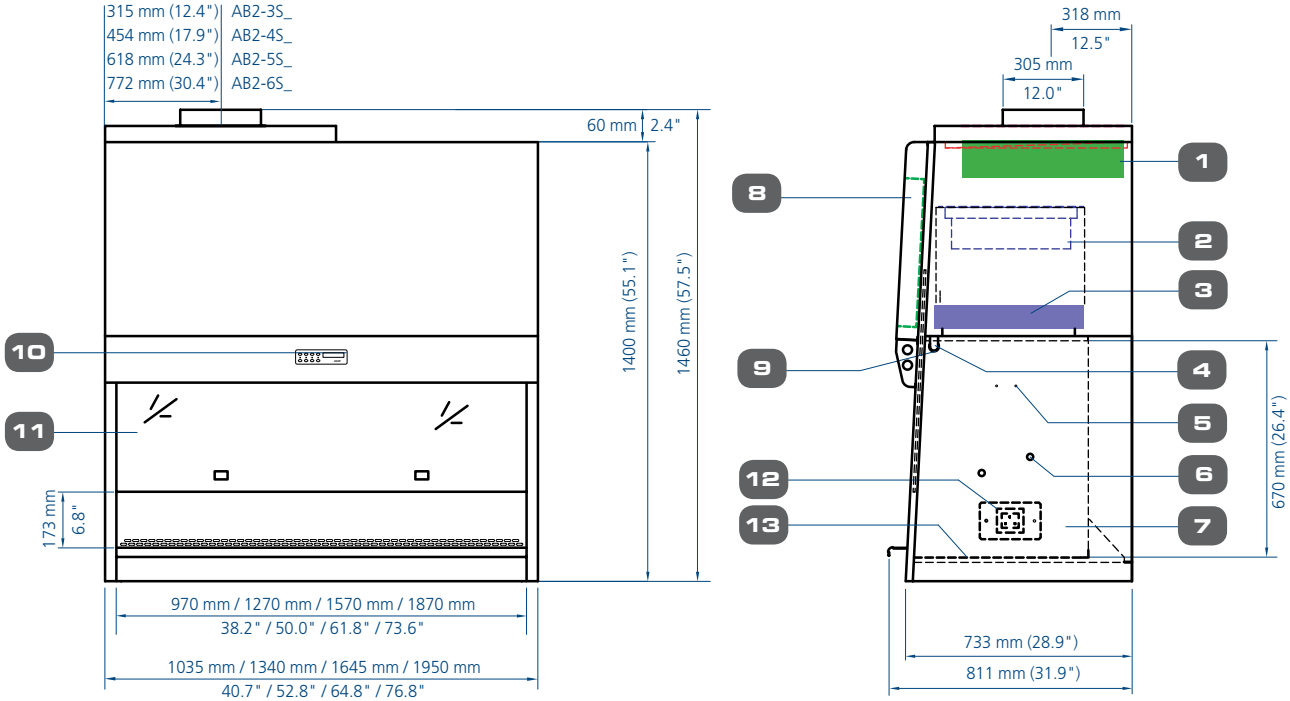
## Cabinet Filtration System


Side capture zones
Dynamic air barrier, inflow and forward-directed downflow air converge
ULPA-filtered air
Unfiltered / potentially contaminated air
Room air / Inflow air

- Ambient air is pulled through the front-grille to prevent contamination of the work surface and work product. The inflow does not mix with the clean air within the cabinet work zone. Inflow air travels through a return path toward the common air plenum (blower plenum) at the top of the cabinet.
- Ambient air is taken in through a prefilter at the top of the cabinet, and passes through the downflow ULPA filter, entering the work zone as laminar flow. The uniform, non-turbulent air stream protects against cross contamination within and throughout the work area.
- Near the work surface, the downflow air stream splits with a portion moving toward the front air grille, and the remainder moving to the rear air grille. A small portion of the ULPA filtered downflow enters the intake perforations at the side capture zones (small blue arrows). The uniform, non-turbulent air stream protects against cross contamination within and throughout the work area.
- A combination of inflow and downflow air streams forms an air barrier that prevents contaminated room air from entering the work zone, and prevents work surface emissions from escaping the work zone. The downflow combined with the inflow air enters the common air plenum.
- All air in the common plenum is HEPA-filtered and exhausted via a dedicated ducting system to the external environment.



## Model AB2, Class II Type B2 (Total Exhaust), Biological Safety Cabinet Technical Specifications




1. *Exhaust HEPA filter*
2. *Blower*
3. *Downflow ULPA filter*
4. *UV Light Retrofit Kit™ provision*
5. *IV-Bar Retrofit Kit™ provision*
6. *Service fixture Retrofit Kit™ provisions (2 on each side wall)*
7. *Internal single-piece stainless steel work zone*
8. *Electrical/ Electronic panel*
9. *Fluorescent lamp*
10. *Esco Sentinel microprocessor control system*
11. *Tempered glass sash window*
12. *Electrical outlet retrofit kit™ provisions (2 no's)*
13. *Single-piece stainless steel work tray*

## General Specifications, Airstream Class II Type B2 (Total Exhaust) Biological Safety Cabinets

*Note to customer: Insert electrical voltage number into last model number digits _ when ordering*

| Model | | AB2-3S_ | AB2-4S_ | AB2-5S__ | AB2-6S__ |
|---|---|---|---|---|---|
| Nominal Size | | 0.9 meters (3') | 1.2 meters (4') | 1.5 meters (5') | 1.8 meters (6') |
| External Dimension (W x D x H) | Without Base Stand | 1035 x 811 x 1460 mm<br>40.7" x 39.1" x 57.5" | 1340 x 811 x 1460 mm<br>52.8" x 39.1" x 57.5" | 1645 x 811 x 1460 mm<br>64.8" x 39.1" x 57.5" | 1950 x 811 x 1460 mm<br>76.8" x 39.1" x 57.5" |
| | With Optional Base Stand, 711mm (28") type | 1035 x 811 x 2171 mm<br>40.7" x 39.1" x 85.5" | 1340 x 811 x 2171 mm<br>52.8" x 39.1" x 85.5" | 1645 x 811 x 2171 mm<br>64.8" x 39.1" x 85.5" | 1870 x 811 x 2171 mm<br>76.8" x 39.1" x85.5" |
| Internal Work Area, Dimensions (W x D x H) | | 970 x 585 x 670 mm<br>38.2" x 23.0" x 26.4" | 1270 x 585 x 670 mm<br>50.0" x 23.0" x 26.4" | 1570 x 585 x 670 mm<br>61.8" x 23.0" x 26.4" | 1870 x 585 x 670 mm<br>73.6" x 23.0" x 26.4" |
| Internal Work Area, Space | | 0.43 $m^2$ (4.67 sq.ft) | 0.58 $m^2$ (6.2 sq.ft) | 0.73 $m^2$ (7.8 sq.ft) | 0.87 $m^2$ (9.3 sq.ft) |
| Tested and Working Opening | | 173 mm (6.8") and 198 mm (7.8") | | | |
| Average Airflow Velocity | Inflow | 0.53 m/s (105 fpm) at initial setpoint | | | |
| | Downflow | 0.33 m/s (65 fpm) at initial setpoint with uniformity of better than +/- 20% | | | |
| Airflow Volume | Inflow | 320 $m^3/h$ (190 cfm) | 419 $m^3/h$ (248 cfm) | 518 $m^3/h$ (307 cfm) | 617 $m^3/h$ (366 cfm) |
| | Downflow | 622 $m^3/h$ (366 cfm) | 815 $m^3/h$ (480 cfm) | 1007 $m^3/h$ (593 cfm) | 1200 $m^3/h$ (707 cfm) |
| | Certification Exhaust (Inflow + Downflow) | 942 $m^3/h$ (556 cfm) | 1234 $m^3/h$ (728 cfm) | 1525 $m^3/h$ (900 cfm) | 1817 $m^3/h$ (1072 cfm) |
| | Concurrent Balance Value Exhaust Volume at corresponding Static Pressure<br>**Note:** Use this for HVAC sizing* | 1056 $m^3/h$ (623 cfm) | 1382 $m^3/h$ (816 cfm) | 1708 $m^3/h$ (1008 cfm) | 2035 $m^3/h$ (1201 cfm) |
| | Minimum exhaust static pressure for clean exhaust filter** | 465 Pa / 1.9 in $H_20$ | 364 Pa / 1.5 in $H_20$ | 330 Pa / 1.3 in $H_20$ | 417 Pa / 1.7 in $H_20$ |
| | Static Pressure with additional 174 Pa (0.7 in $H_2O$) required by NSF/ANSI 49:2008<br>**Note:** Use this for HVAC sizing* | 639 Pa / 2.6 in $H_20$ | 538 Pa / 2.2 in $H_20$ | 504 Pa / 2.0 in $H_20$ | 591 Pa / 2.4 in $H_20$ |
| Downflow ULPA Filter Typical Efficiency | | >99.999% for particle size between 0.1 to 0.3 microns | | | |
| Exhaust HEPA Filter Typical Efficiency | | >99.99% at 0.3 microns | | | |
| Sound Emission*** | NSF/ANSI 49 | <59 dBA | <59 dBA | <60 dBA | <60 dBA |
| | EN 12469 | <56 dBA | <56 dBA | <57 dBA | <57 dBA |
| Fluorescent Light Intensity At Zero Ambient | | >1000 Lux<br>(>93 foot candles) | >1000 Lux<br>(>93 foot candles) | >900 Lux<br>(>84 foot candles) | >1000 Lux<br>(>93 foot candles) |
| Cabinet Construction | Main Body | 1.5 mm (0.06") 16 gauge electro-galvanized steel with Isocide white oven-baked epoxy-polyester powder-coating | | | |
| | Work Zone | 1.2 mm (0.05") 18 gauge electro-galvanized steel with Isocide white oven-baked epoxy-polyester powder-coating | | | |
| Electrical**** | 220-240V, AC, 50Hz, 1ø | AB2-3S1 | AB2-4S1 | AB2-5S1 | AB2-6S1 |
| | Cabinet Full Load Amps (FLA) | 2 A | 2 A | 2 A | 2 A |
| | Optional Outlets FLA | 5 A | 5 A | 5 A | 5 A |
| | Cabinet Nominal Power | 277 W | 292 W | 330 W | 340 W |
| | Cabinet BTU | 945 | 996 | 1126 | 1160 |
| | 110-120V, AC, 60Hz, 1ø | AB2-3S2 | AB2-4S2 | AB2-5S2 | AB2-6S2 |
| | Cabinet Full Load Amps (FLA) | 3.5 A | 3.5 A | 3.5 A | 3.5 A |
| | Optional Outlets FLA | 5 A | 5 A | 5 A | 5 A |
| | Cabinet Nominal Power | 293 W | 309 W | 334 W | 360 W |
| | Cabinet BTU | 1000 | 1054 | 1140 | 1228 |
| | 220-240V, AC, 60Hz, 1ø | AB2-3S3 | AB2-4S3 | AB2-5S3 | AB2-6S3 |
| | Cabinet Full Load Amps (FLA) | 2 A | 2 A | 2 A | 2 A |
| | Optional Outlets FLA | 5 A | 5 A | 5 A | 5 A |
| | Cabinet Nominal Power | 293 W | 308 W | 345.8 W | 356 W |
| | Cabinet BTU | 1000 | 1051 | 1180 | 1215 |
| Net Weight***** | | 175 kg (386 lbs) | 229 kg (505 lbs) | 238 kg (525 lbs) | 279 kg (615 lbs) |
| Shipping Weight, Maximum***** | | 232 kg (511 lbs) | 273 kg (602 lbs) | 295 kg (650 lbs) | 350 kg (772 lbs) |
| Shipping Dimensions, Maximum (W x D x H)***** | | 1150 x 850 x 1760 mm<br>45.2" x 33.5" x 69.3" | 1450 x 850 x 1760 mm<br>57.1" x 33.5" x 69.3" | 1750 x 850 x 1760 mm<br>68.9" x 33.5" x 69.3" | 2050 x 850 x 1760 mm<br>80.7" x 33.5" x 69.3" |
| Shipping Volume, Maximum***** | | 1.72 $m^3$ (61 cu.ft.) | 2.17 $m^3$ (77 cu.ft.) | 2.62 $m^3$ (93 cu.ft.) | 3.07 $m^3$ (108 cu.ft.) |

* *This Concurrent Balance Value (CBV) Exhaust (per Pitot Duct Traverse) and Static Pressure must be used when sizing the HVAC exhaust & supply.*
** *This minimum exhaust static pressure for clean exhaust filter should not be used for exhaust fan sizing, and it is listed here for comparative purpose only.*
*** *Noise reading in open field condition / anechoic chamber.*
**** *Additional voltages may be available; contact Esco for ordering information.*
***** *Cabinet only, excludes optional stand.*

Biological Safety Products
Cleanroom Products
Containment / Pharma Products
Ductless Fume Hoods / Carbon Filtration
General Purpose Scientific Equipment
Industrial Lab Equipment
In-Vitro Fertilization Products
PCR Products
Pharmacy Products
Lab Animal Research Products
Lab Thermostatics Products
Lab Ventilation / Chemical Fume Products / Lab Furniture
Powder Handling Products

*Since 1978, Esco has emerged as a leader in the development of controlled environment, laboratory and cleanroom equipment solutions. Products sold in more than 100 countries include biological safety cabinets, fume hoods, ductless fume hoods, laminar flow clean benches, animal containment workstations, cytotoxic cabinets, hospital pharmacy isolators, and PCR cabinets and instrumentation. With the most extensive product line in the industry, Esco has passed more tests, in more languages, for more certifications, throughout more countries than any biosafety cabinet manufacturer in the world. Esco remains dedicated to delivering innovative solutions for the clinical, life science, research and industrial laboratory community. www.escoglobal.com.*

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